

Corrosion Behaviour of Low-Alloyed Chrome Alloys with Cathodic Additions in Sulphuric Acid Solutions

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Corrosion electrochemical behaviour of Cr and low-alloyed Cr alloys with plasticising and cathodic additions of Os, Ru and Ir up to 0.4 wt.% and Re up to 1 wt.% was studied in H₂SO₄ solution. During anodic polarisation in 5-40% H₂SO₄ at 25-90°C, Cr became passive at negative potentials. The addition of 0.1-0.4% Os, Ru, or Ir to Cr results in its transition to a stable passive state with high corrosion stability.

ELECTRICAL AND ELECTRONIC ENGINEERING

Formation of p-n Junctions and Ohmic Contacts at Laser Processed Pt-Si Surface Layers

C. J. DOHERTY, T. E. SEIDEL, H. J. LEAMY and G. K. CELLER, *J. Appl. Phys.*, 1980, **51**, (5), 2718-2721

Pt-Si alloy layers were formed during 130 ns pulsed irradiation of Pt coated Si with light from a Nd:YAG laser. The alloys form via surface melting and resolidification. Laser processing of As in the ion implanted p-type Si resulted in formation of a p-n⁺/Pt-Si structure that showed rectifying electrical behaviour. The structure arose because the As and Pt impurities were zone refined to different extents.

NEW PATENTS

METALS AND ALLOYS

Y-Containing Platinum Group Metal Doped Superalloys

JOHNSON MATTHEY & CO. LTD.

British Appl. 2,033,925 A

Ni-based alloys suitable for use in glass fibre production contain 5-25% Cr, 2-7% Al, 0.5-5% Ti, 0.01-3% Y and/or Sc, and 3-15% of a platinum group metal such as Pt, with Ni balance.

Amorphous Iron-Ruthenium Magnetic Alloy

SONY CORP.

U.S. Patent 4,190,438

An amorphous Fe alloy for the magnetic head of a recording apparatus, having a reduced magnetostriction coefficient, contains 2-20% Ru and 10-30% of P, C, Si, B or Ge.

Gold-Palladium-Chromium Spark Plug Alloy

N.G.K. SPARK PLUG CO. LTD. *U.S. Patent* 4,195,988

An alloy having good heat resistance and resistance

Ion-Implanted Low-Barrier PtSi Schottky-Barrier Diodes

J. B. BINDELI, W. M. MOLLER and E. F. LABUDA, *IEEE Trans. Electron Devices*, 1980, **ED-27**, (2), 420-425

An ion implanted shallow n⁺ layer was used to lower the barrier height of PtSi-n-Si Schottky diodes. Reductions up to 200 mV were achieved with little degradation of the reverse current characteristics. During silicide formation the implanted ions are pushed ahead of the PtSi-Si reaction zone and pile up at the silicide-Si interface, giving more barrier lowering than expected from the ion-implant dose. This gives a range of barrier heights and allows high and low-barrier diodes to be fabricated on the same i.c. by a selective implant masking step.

MEDICAL USES

Antitumour Agents. Synthesis of Novel cis-Palladium Complexes and Their Action on Supercoiled DNA

G. R. NEWKOME, M. ONISHI, W. E. PUCKETT and W. A. DEUTSCH, *J. Am. Chem. Soc.*, 1980, **102**, (13), 4551-4552

The synthesis of a stable cis-organometallic reagent containing two cis σ -Pd-Cu bonds making up a novel [5.5.5.] fused-ring system is reported. This has the ability to nick supercoiled DNA at low concentrations. Selected cis Pd organometallics may act in a manner similar to that of known intercalating anti-tumour Pt drugs.

to Pb poisoning, when used as the centre electrode of a spark plug, contains 30-70% Pd, 1-10% Cr and the balance Au.

CHEMICAL COMPOUNDS

Rhodates in Resistance Materials

N.V. PHILIPS' GLOEILAMPENFABRIEKEN

British Appl. 2,032,416 A

BaRh₆O₁₂ is claimed per se as a new material. It has a linear positive temperature coefficient of resistance, TCR, and by combining it with a material of negative TCR, it enables a material with a very low TCR to be produced.

Thallium Rhodate

N.V. PHILIPS' GLOEILAMPENFABRIEKEN

British Appl. 2,032,416 A

A resistance material is formed from a permanent binder, a temporary binder and a rhodate of formula Tl_{1-x}Pb_xRh₂O₄ where 0.5 > x ≥ 0. The rhodate may be mixed with a resistance material having a temperature coefficient of resistance, TCR, of opposite sign, to produce a resistor with a low TCR.

Photosensitive Complexes

EASTMAN KODAK CO. *European Appl.* 11,754

Complexes which can be used in thermally developable photographic compositions, especially in combination with Ag carboxylates are transition metal complexes of organotellurium compounds. Preferred complexes are $\text{PdX}_2[\text{Te}(\text{C}_6\text{H}_5)_n\text{SiMe}_3]_2$.

ELECTROCHEMISTRY

Impressed Current Corrosion Protection Anode

I.M.I. MARSTON LTD. *British Patent* 1,568,885

An anode for use in extreme conditions, for instance the North Sea, is formed from three or more rods, secured in a spaced parallel arrangement. The rods are formed from a film-forming metal, preferably Nb, and are coated with an anodically active material, preferably Pt. The use of three or more rods enables less Nb and Pt to be used to provide cathodic protection for a comparable area than that provided by a larger single rod.

Liquid Permeable Electrode

U.S. DEPARTMENT OF ENERGY *U.S. Patent* 4,193,860

Fluid permeable electrodes for use in H_2 generation cells are prepared by embedding activated C in a carbonaceous matrix. The activated C may be catalysed with Pt to assist electron transfer between the electrode and electrolyte.

ELECTRODEPOSITION AND SURFACE COATINGS

Depositing Protective Coatings

WARNER-LONDON INC. *British Patent* 1,569,145

A refractory or protective metal having a melting point above 1490°C may be deposited on a metal or metal containing substrate if it is combined with an electrolyte which acts as a buffer between the protective metal and the metal substrate. Coating metals include Os, Pt, Pd, Rh, Ru and Y.

Electrodeposition of Ruthenium-Iridium Alloys

INTERNATIONAL NICKEL CO. INC.

U.S. Patent 4,189,358

Ru-Ir alloys are deposited from a bath containing non-cyanide metal salts, fluoroborate salts, fluoboric acid and optionally sulphamic acid. The baths are mainly for preparing insoluble electrodes.

Electroless Palladium Plating

SIEMENS A.G. *German Offen* 2,841,584

A bath for the electroless deposition of Pd contains a Pd compound, a reducing agent, complexing agents, a stabiliser which is a mercaptoformazan, preferably N,N'-diphenyl-mercaptoformazan, and 10-20 g/l of an accelerator which is preferably 2-hydroxy-4-methyl-benzoic acid.

LABORATORY APPARATUS AND TECHNIQUE

Moisture Sensor

LICENTIA PATENT/VERWALTUNGS G.m.b.H

British Appl. 2,034,896 A

A moisture sensor, for use in a laundry dryer, has two discrete electrical tracks of plated Rh, or other conductive metal coated with Au, deposited on an insulating substrate. The tracks are covered with a moisture absorbing layer whose electrical resistance varies according to the amount of moisture present.

Oxygen Sensor

E. I. DU PONT DE NEMOURS & CO.

British Appl. 2,037,432 A

An I.C.E. exhaust gas sensor of the solid electrolyte type has an electrode formed by a perovskite, a Pt metal perovskite such as $\text{La}_{0.8}\text{Sr}_{0.4}\text{Co}_{0.8}\text{Pt}_{0.2}\text{O}_3$, covered with a permeable layer of Mg spinel.

Humidity Detectors

MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD.

European Appls. 13,022 and 13,030

Humidity detectors are plates of specified porcelain ceramics with fired on resistance heating elements of a Ru oxide paste to which are attached Pt-Ir wires.

JOINING

Platinum Catalysed Organopolysiloxanes

SHIN-ETSU CHEMICAL CO. LTD. *U.S.* 4,196,273

A new Pt catalysed organosiloxane composition provides low temperature curing, self bonding adhesive compositions.

Soldering Iron

DEUTSCHE GOLD-UND SILBER-SCHNEIDANSTALT

German Offen. 2,847,482

In a rapid heating hand held soldering iron the heating element is a film resistor, preferably of Pt.

Palladium Solder

S. M. LOTSMANOV ET AL *Russian Patent* 671,964

An acid resistant and heat resistant solder contains Cr 16-24%, Ni 29-36, Pd remainder.

HETEROGENEOUS CATALYSIS

Lanthanum Rhodite Catalysts

JOHNSON MATTHEY & CO. LTD.

British Patent 1,568,370

A catalyst which will remove NO under oxidising conditions consists of a compound $\text{A}_x\text{M}_y\text{O}_z$ in which A is a variety of metals, including the lanthanide metals and M is Pt, Pd, Ir, Ru or Rh on a support having a refractory metal oxide intermediate layer. The compound, which is preferably of perovskite structure, may be LaRhO_3 , BaRuO_3 , LaPtO_2 , MgRh_2O_4 , Ba_4PtO_6 , $\text{Co}(\text{Al,Rh})_2\text{O}_4$ or CdPd_3O_4 .

Simultaneous Jet Fuel and Diesel Fuel Production

U.O.P. INC. *British Appl. 2,031,946 A*

Simultaneous production is achieved in a single stage hydrocracking at below 482°C and 69 atm using a platinum group metal or Group IVB/VIII metal mixture as catalyst.

Solar Radiation Absorbers

RHONE POULENC INDUSTRIES

British Appl. 2,034,021 A

The cylindrical shaped absorber is formed from an organosilicon rubber, for example, Pt catalysed hydrogeno-organopolysiloxanes, and has two flexible conducting foils, of, for example, Al, encircling the absorber tube.

Catalyst

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

British Appl. 2,034,596 A

A fluid treatment device, such as a catalyst, consists of parallel elongated helically wound coils of wire connected together to form a raft-like sheet. If the catalyst is to be used for I.C.E. purification, the coils are constructed from a platinum group metal or wire coated with a platinum group metal.

Catalytic Cell for Treating Cooking Fumes

DE DIETRICH & CIE. S.A. *British Appl. 2,035,826 A*

Fumes from a cooker pass through a ceramic block held between two plates. The block is impregnated with a Pt or another platinum group metal catalyst and an integral heater raises the temperature of the fumes and activates the catalyst.

Pollution Control in Furnaces

JOHNSON MATTHEY & CO. LTD.

British Appl. 2,037,607 A

Energy is recovered from a fluid stream by passing it with fuel through a heat exchanger coated with a catalyst so that intrinsic heat and catalytic oxidation heat may be recovered together. The catalyst may consist of a platinum group metal, or alloy, applied over a refractory oxide wash coat.

Ethanol Synthesis

HOECHST A.G.

European Appl. 10,295

Synthesis gas is converted to ethanol in the presence of a supported Rh catalyst and a co-catalyst which contains one or more of Zr, Hf, La, Cr, Hg and Pt. The two active components may be present as a compound, $M_n[RhCl_6]_b$.

Nitrobenzene Hydrogenation

BAYER A.G.

European Appl. 11,090

Aniline is obtained by the vapour phase hydrogenation of nitrobenzene in the presence of a catalyst which is an Al_2O_3 carrier supporting 1–10 g/l Pd, 5–15 g/l V, Nb, Ta, Cr, Mo, W or Ti and optionally 1–10 g/l Pb, Zn or Bi.

Rhodium and Iridium Hydroformylation Catalysts

CONOCO INC.

U.S. Patent 4,185,038

Rh and Ir compounds covalently bound directly to inorganic oxide polymers, and to open-lattice clays, are excellent hydroformylation catalysts.

Palladium Zeolite Upgrading Catalysts

CHEVRON RESEARCH CO.

U.S. Patent 4,191,634

Light paraffinic hydrocarbons may be effectively upgraded by consecutive contact with a Pd-HY-zeolite catalyst and a HZSM-5 zeolite catalyst.

Hydrocarbon Dealkylation Catalysts

ELF UNION

French Appl. 2,423,469

The steam dealkylation of alkyl aromatic hydrocarbons is catalysed by a mixture of two metals supported on a spinel carrier. Preferably at least one of the metals is from the platinum group and the most preferred combinations are Rh-Ir and Rh-Mn.

Rankine Cycle Engine with Catalytic Combustor

JOHNSON MATTHEY & CO. LTD.

French Appl. 2,425,539

Catalytic oxidation of a major proportion of the fuel in a Rankine cycle engine takes place in an external combustor enabling the engine to be used where noise and pollution limits apply. The catalytic metal or alloy, such as Pt-Rh, is supported on a monolith coated with an oxide such as Al_2O_3 .

HOMOGENEOUS CATALYSIS

Platinum Catalyst for Internal Olefin Hydroformylation

SHELL INTERNATIONALE RESEARCH M.I.J.B.V.

British Appl. 2,036,024 A

A ligand-stabilised Pt carbonyl halide catalyst, such as $PtCl(CO)(PPh_3)_2ClO_4$ in the presence of a non-coordinating Sn, Zn or Ge halide, is used for the hydroformylation of internal olefins to linear aldehydes.

Hydroformylation and Hydrohydroxymethylation Catalysts

S.R.I. INTERNATIONAL

British Appl. 2,037,178 A

The production of aldehydes from olefins and alcohols from aldehydes is catalysed by a mixed carbonyl of Ru and at least one other Group VIII metal, such as $Ru_3(CO)_{12}/Fe_3(CO)_{12}$ or $Ru_3(CO)_{12}/Ir_4(CO)_8$.

Alcohol Separation

UNION CARBIDE CORP.

U.S. Patent 4,191,701

Alcohol products from the reaction between C oxides and H_2 in a homogeneous liquid phase containing a Rh carbonyl catalyst are separated by volatilising the product while simultaneously maintaining the mixture in contact with CO gas to enhance the solution stability of the catalyst.

Mixed Metal Catalysts

HOECHST A.G. *German Offen.* 2,846,148
The synthesis of ethanol from CO and H₂ is catalysed by a Rh compound and a co-catalyst metal, optionally in the form M_x(Rh Cl₆)_y, where M, the co-catalyst, is one or more of Zr, Hf, La, Pt, Cr and Hg.

FUEL CELLS

Screen Printing Method for Electrode Manufacture

UNITED TECHNOLOGIES CORP. *U.S. Patent* 4,185,131
A fuel cell electrode is prepared by screen printing on ink, prepared from a dried floc of C and PTFE on to a porous substrate. After compacting and sintering the layer is catalysed with Pt.

Fuel Cell

FORD MOTOR CO. *U.S. Patent* 4,195,119
A honeycomb structure is used as a separator in an economical design for a fuel cell. Separate catalyst materials, such as C and Pt, are applied as wash coatings to alternate compartments of the honeycomb by plugging to obtain fuel and oxidant compartments.

CHEMICAL TECHNOLOGY

Unsaturated Polymer Oxidation

FRENCH MINISTER OF MUNITIONS
British Patent 1,571,430
A macromolecular compound having a functional group at each end of the molecule is obtained by cleaving the C-C double bond of an unsaturated polymer with RuO₂. The polymer may be a rubber produced from a diene and the products are useful rocket fuels. A Ce compound may be used as a co-oxidising agent.

Stripping of Platinum from Superalloys

JOHNSON MATTHEY & CO. LTD.
British Appl. 2,031,951 A
A metal or alloy may be removed from the surface of turbine blades and other metal substrates by forming on or close to the body a metal which will alloy with the metal to be removed. By forming the metal, in situ, for example by electrolytic methods, attack of the underlying substrate is avoided.

GLASS TECHNOLOGY

Palladium Induced Stains on Glass-Ceramic Articles

P.P.G. INDUSTRIES INC. *U.S. Patent* 4,192,666
Uniformly coloured brown stain decoration is obtained on glass-ceramic articles by silk-screening a Pd colourant composition on to the article after it has been subjected to a crystallising heat treatment and then carrying out a second heat treatment to produce the stain decorations.

Spectacle Glass Compositions

FA. JENAER GLASWERK SCHOTT & GEN.
French Appl. 2,428,013

Low-density, highly refractive Ti/Ir silicate glasses for making bifocal spectacle lenses may contain minor proportions of La oxide, Gd oxide and/or Y oxide.

ELECTRICAL AND ELECTRONIC ENGINEERING

Catalytic Battery Storage Cap

NIPPON TELEGRAPH & TELEPHONE PUBLIC CORP. & JAPAN STORAGE BATTERY CO. LTD.
British Patent 1,569,449

A new form of cap, containing a Pd/Al₂O₃ catalyst for water recombination in storage batteries, is designed to operate with large batteries where high catalyst temperatures may occur.

Semiconductor Film

EXXON RESEARCH & ENGINEERING CO.
European Appl. 10,415

A stable photoconducting semiconducting film is obtained by electrolytic deposition of a Si layer on to a Nichrome cathode using a Pt anode, and stabilising the film in an atmosphere of He or H₂ for 30 minutes. Subsequently a pellucid layer of high work function, such as Ir, Pd or Pt can be deposited on the stabilised film to produce photovoltaic devices.

Platinum Group Metal Oxide Solid Electrolyte Capacitor

MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD.
U.S. Patent 4,186,423

A solid electrolyte capacitor having superior resistivity and leakage current characteristics to a MnO₂ capacitor, makes use of an oxide of Ru, Rh, Ir, Os or Re, as the electrolyte material. Ru oxide used in combination with Mn oxide is the preferred electrolyte material.

MEDICAL USES

Gold Alloys for Fusion to Porcelain

BRISTOL MYERS CO. *British Appl.* 2,034,751 A
A low cost, castable dental alloy for fusion to dental porcelain contains 30-50% Au, 30-50% Pd, 5-30% Ag, 0.01-5% of Si, B, and/or Ge and 0-10% Ru and optionally other elements, such as In and Sn, to improve the strength of the alloy. The alloys do not cause discolouration and greening of the porcelain jacket when used for dental restoration work.

Eradication of Skin Blemishes

JOHNSON MATTHEY & CO. LTD.
British Appl. 2,035,080 A
Skin blemishes may be treated with a Pt(II) or (IV) complex of the *cis*-Pt diamino dichloride type.